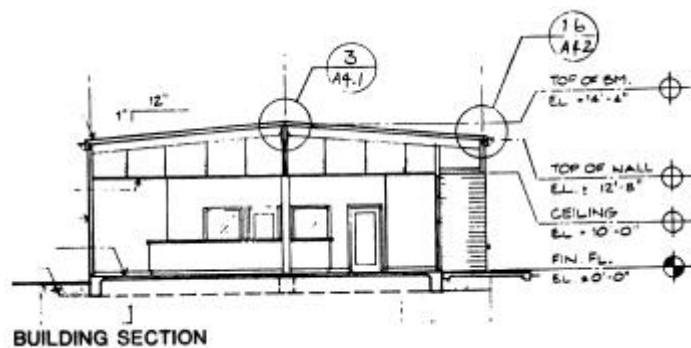




At last, the final phase is completing the drawings. If all has gone well, earlier decisions simply need to be executed and all of the details worked out to make the documents into something on which the contractor can bid and from which the project can be built. But wait! Don't shortchange this step. Most important in finalizing the drawings is making certain they are complete and understandable and that they make sense from a constructability perspective.

There shouldn't be any surprises or major cost changes during this last design effort, but careful review is warranted.



**Track Earlier Decision;
Perform Constructability
Review**

Make sure earlier decisions are carried out during this final phase. Also, make sure that the drafting team preparing details and specifications does not make achieving your goals an overly complicated task. You should build time into the process to ensure the drawings do not go out to bid until they are correct.

The project architect should be overseeing his team. Your construction management team should be actively participating in the process. Also, user representatives should review the plans to make certain that the facility can be operated as intended.

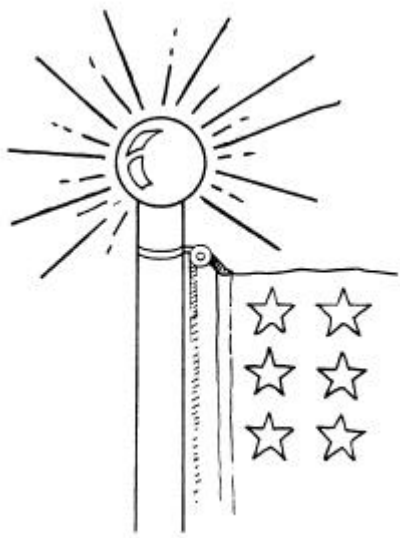
The architect's final effort to complete the drawings is crucial in controlling costs. All too often the entire team is worn down by the numerous large problems which had to be solved to reach this point of crucial final review. But if all of the details and specifications contain difficult methods, if materials specified are the most expensive available, the project cost can easily be affected by 20 percent without any noticeable difference in the appearance or function of your building. Consider the cost impact if the drawing of one detail costs twice as much to implement as it should and that detail occurs in hundreds of places throughout the project.

Because those who will more than likely be producing the details on your drawings are your architect's junior staff under the supervision of one or two more experienced architects, it is essential that the drawings be thoroughly reviewed for constructability by both the architect's senior staff and at least one other party such as your construction manager.

This is especially important when the architect's firm is organized into design and production teams or when a joint venture firm is using different offices for design and technical production. Communication of design intent and budget considerations to all working on your project is essential.

Specifically, go through the details of the drawings and specifications as they are prepared and when they are finished to make sure products specified are not unnecessarily gold-plated.

If you think "gold plating" is just a figure of speech, check the specifications for the ball at the top of your flag pole.



The ball may, in fact, be gold-plated. Do you think anyone will ever notice or compliment you on your gold-plated ball 70 feet in the air? This does happen. Hopefully, the press won't find it before you do.

On a more mundane level, be aware that most architectural firms have a standard set of specifications on their word processor. Your specifications must be checked to see if they are appropriate for your job. The following are a few examples of what may happen:

Avoid Learning The Hard Way The last job your architect's mechanical consultant completed used high-pressure steam piping. Your job is low-pressure steam. The valves specified for your job should be cast iron, but the specifications, lifted from the last job, call for brass. Although this may seem like a minute detail, the brass valves each cost \$400 more than the cast-iron. You need 100 of them. If unchanged, when the bids come in you will have spent \$40,000 for nothing. After the contractor gets the job he may offer you a \$20,000 credit for using the cast iron valves. Such a deal. If you are fortunate enough to have the contractor catch this, you may get a \$20,000 credit, but the contractor will be paying for his new boat with the other \$20,000.

Another frustrating example is a specification which requires one-half inch of fire coating when code calls for one inch. If the discrepancy isn't caught in review, it can delay your project by a month or more and cost tens of thousands of dollars to remedy.

Check how the specifications affect the qualifications required for each piece of work. Specifications often will require a minimum amount of contractor experience for installation of specialty items. This is especially true with security items. You want someone with experience installing your specialty work. But make sure an item like standard cyclone fencing is not included with the special security systems requiring 25 years of experience. Installing security systems is far more complicated than installing a fence. If the two are grouped - and it has happened - you may prevent all of the local fence contractors from bidding. In fact, you may eliminate nationwide all but one or two specialty contractors who know they are not competing with anyone and will therefore charge you twice what the fence is worth and still use the same local subcontractor at the real price.

Check the specifications for the appropriateness of each area. The cost can vary by 200 or 300 percent. Perhaps you want top-of-the-line material in the lobby. Is the same

material being used in storage areas where appearance doesn't matter? These are things to look for.



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As a general rule, a change order that increases your cost is usually negotiated at retail value, while one that's bound to reduce your cost is offered at wholesale value. If forced to use change orders, make sure your negotiator is aware of this.

Review For Completeness and Coordination

It has been said that the number of change orders you experience is directly proportional to the amount of time spent in constructability review.

Construction industry horror stories abound about change orders and claims that arise during the construction phase of projects. Most of these problems and additional costs grow out of incomplete or uncoordinated drawings.

The best change order prevention plan is to make certain your experts take the time to complete and check the drawings.

The worst coordination problems arise when four or five different parties produce the drawings and specifications in different offices, possibly in different cities. Most architectural firms hire subconsultants to design civil, structural, mechanical and electrical systems. Additional consultants often are brought in for security, special equipment for kitchens, and communications. Even if your architect has some of these disciplines within his/her office, interdisciplinary communication still must, but often doesn't, take place.

Ensuring that all of the pieces fit together is the architect's ultimate responsibility. Because of the technical aspects involved and the volume of information which must come together in the last month of the drawing process, this is a very difficult challenge.

For example, imagine if the duct work for the heating system does not fit between the ceiling and the beams of the structure. Now what? It is advisable to have at least

one party, such as your construction manager or county engineer, review the drawings in addition to the architect.

So, remember, when the drawings are due and your architect says he needs more time, you're taking a risk in cutting the process short even when it comes down to the final deadline decisions. Hopefully, your project schedule was realistic and everything was properly monitored to avoid a situation during which two months' work must be done in one month. When you cut the design process short one month to get construction started, you may be adding three months and thousands of dollars in cost to the project.

Check Your Contact

Contractual obligations define when the contractor will finish the job, what roles others will play in the process, and what water and electricity, if any, will be provided to the contractor during the process. This part of the contract must be clear and make sense. **Wherever the contractor confronts ambiguities when preparing his bid, he will add expense as a safeguard or he will anticipate how he can turn the ambiguity into a change order after landing the job. Insurance, bond requirements, and any state or federal requirements should be stated in the contract.**

Make sure the schedule is what you want and, at the same time, is realistic. To gain clout in convincing the contractor to meet your schedule, liquidated damages (a daily fee for being late) may be included in the contract.

Remember, when you have an accelerated schedule and liquidated damages to enforce the schedule, the project will cost more because the contractor will have to pay overtime to get the job done or he will include in his bid the amount of liquidated damages he figures he will have to pay because the schedule cannot be met. When establishing the schedule, the best approach, then, is to have realistic ideas about how long it will take to build the project under normal circumstances and what the contractors costs will be. Is the additional cost worth the time saved? Was the cost of an accelerated schedule originally included in the budget

If you plan to occupy part or all of the facility for training or equipment installation before the contractor is completed with his contract, this should be stated clearly in the contract. Without such notification, the contractor may have legal grounds to charge you for slowing his work or extending his schedule because you are in the way.

Also important to the building process is making certain the project is adequately advertised so contractors are aware that the project is out to bid. Give the bidders a reasonable amount of time to put together their estimates. Contractors need time to get documents to their subcontractors, for the subcontractors to prepare their prices, and to get the whole package put back together (unless the project is bid with subcontracts direct to the owner). Without enough time, the contractor is forced to guess for those parts of the work he can't completely estimate. When contractors guess, they guess high because it is their money on the line.

When bidding the project, consider using additive alternates. If the estimate indicates the project is close to or perhaps over budget, parts of the project which are desired but are not essential can be bid as separate items. If the bids come in lower than expected, then these things can be included. If the prices are higher than anticipated, then these things can be left out of the contract, but the project can proceed. You should be identifying possible alternates no later than the beginning of construction documents so that these alternates can be clearly defined in the bid documents. As alternate bids can make the bidding forms and contracts complicated, take care to review them for accuracy in defining what is in each alternate.

The Budget

The ongoing estimating process should verify previous cost projections or identify variances. If the final estimate indicates that some components cost more than anticipated or that there was a change in scope which increased costs (with no offsetting drops in cost), then this is your last chance to decide what you can live without or what you should bid as an additive alternative (as described above). More positively, if the estimate reveals leftover money, you should now consider any items you wanted but left out initially.

The process should not wait until the drawings are complete. It must be an ongoing verification of previous assumptions with the cost control reports issued whenever a variance occurs. Then, when the drawings are complete, you will know where you stand with your budget. If you wait until the drawings are complete and then spend a month preparing a new detailed estimate, you may very well find that two months of drawing time were wasted because you are over budget and must redesign before bidding.

**CONSTRUCTION
DOCUMENTS**

1. Are the drawings and specifications really complete or has the deadline arrived and is the architect just giving you what's been done to date?

Yes**No****Not Sure**

2. Are the documents well coordinated? How can you be sure?

Yes**No****Not Sure**

3. Have the documents been checked for constructability and gold-plated specifications?

Yes**No****Not Sure**

4. Does the contract lay out the schedule you want? Is it realistic? Are you aware of the cost impact of an accelerated schedule?

Yes**No****Not Sure**

5. Does the final estimate leave you on budget? Does the budget for each system reflect the design development budget if not, why?

Yes**No****Not Sure**

6. Has someone put together a thorough bidders list called the contractors in advance, and sufficiently advertised the project?

Yes**No****Not Sure**

7. Are the plans being developed according to your bidding strategy?

Yes**No****Not Sure**